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STONE IMPLEMENTS FROM TRENTON AND STATEN ISLAND: CHARACTER AND SOURCES OF MATERIALS

By J. VOLNEY LEWIS

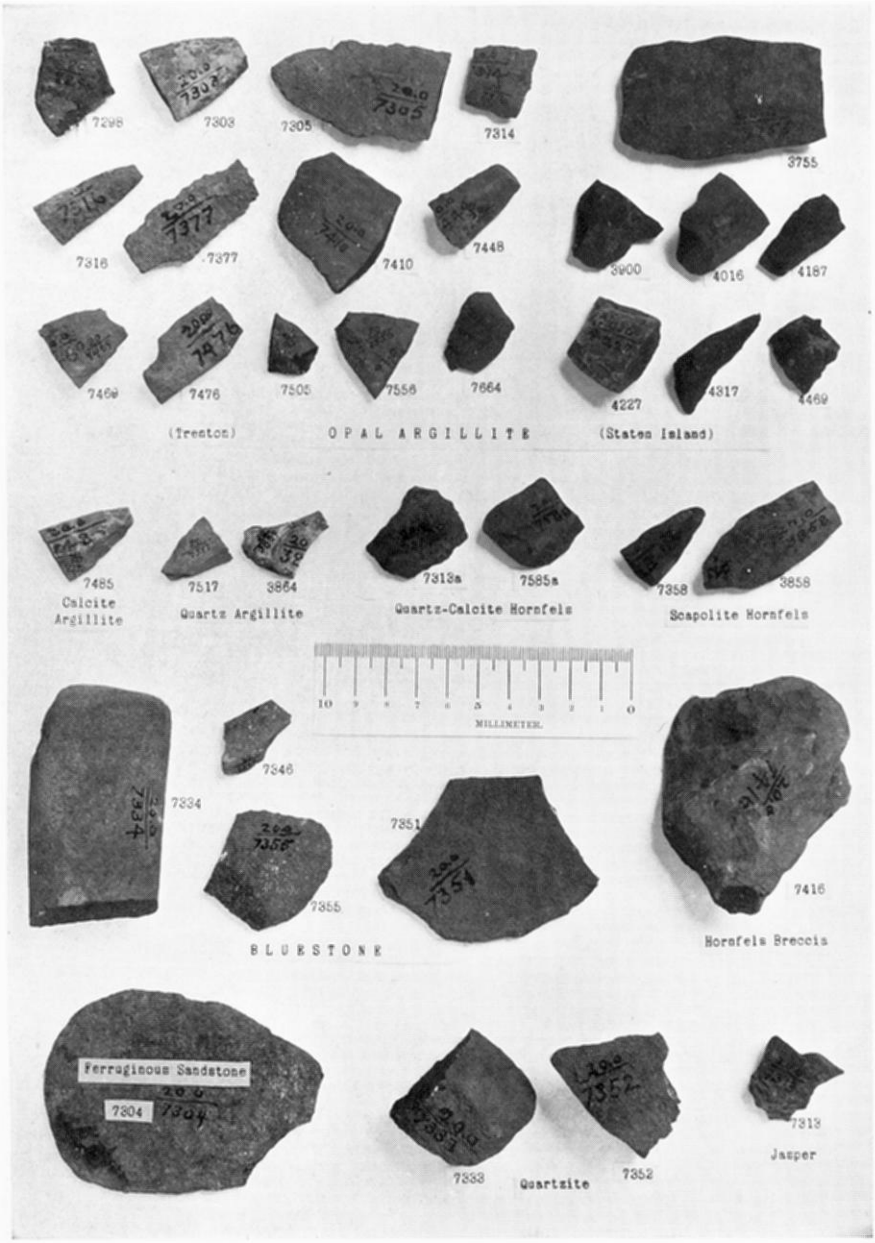
Introduction

THE materials used in this investigation include thirty arrow points and other implements and fragments from the Abbott farm, near Trenton, and ten specimens from village sites on Staten island. Of the total of forty, thirty-six are shown in plate VIII; the other four (three from Trenton and one from Staten island) were destroyed in the preparation of the thin sections for microscopic study.

General Character

Seventeen of the thirty specimens from Trenton and nine of the ten from Staten island are dark brown and purple to black argillite, identical in character with well-known facies of Triassic argillite, prominent outcrops of which occur along the Delaware and its tributaries from five to thirty miles distant from Trenton. Four other specimens from Trenton and the remaining one from Staten island are very similar in appearance to the argillite, but are harder and more flinty in character and are known as hornfels. These are exactly like the hard-baked varieties of Triassic shale and argillite along the contacts of the intrusive trap rock (diabase) masses of both New Jersey and Pennsylvania.

There are eight specimens of sandstone, and four of these are of the variety commonly known as "bluestone," a hard, fine-grained, bluish-gray sandstone used extensively in the form of thin slabs as flagstone. Such material occurs in great abundance in the Hamilton (Devonian) formation of southeastern New York and continues southwestward into Pennsylvania near the north-



STONE IMPLEMENTS FROM TRENTON, N. J. AND STATEN ISLAND, N. Y.

western corner of New Jersey. The famous Hudson river bluestone, once extensively used in New York and other cities, has been quarried in many places along the middle reaches of the Hudson. Flagstone of nearly the same character also occurs a little nearer, in the same general region, in the Martinsburg (Ordovician) formation of northern New Jersey and adjacent states, where it has been quarried in a few places. Numerous outcrops of these bluestone formations occur in New York, New Jersey, and Pennsylvania, within fifty to seventy-five miles of Trenton.

Of the other four specimens in the sandstone group, one is a dark purplish-red, highly ferruginous sandstone; two are quartzite, a hard, highly silicified variety of sandstone; and one is a dense yellowish jasper. These may be correlated with well-known varieties of Hardyston (Lower Cambrian) sandstone and quartzite, which outcrop in many places in northern New Jersey and southward in Pennsylvania, within forty miles or less from Trenton.

The remaining specimen (from Trenton) is siliceous oolite, identical in character with Cambrian and Ordovician oolites of central Pennsylvania. These are particularly abundant about State College and Bellefonte, in Center county, about 175 miles from Trenton; but similar rocks in smaller amounts are also known in the eastern parts of the State and in northern New Jersey, in oolitic beds of the same ages, providing a possible source within forty miles of Trenton.

References are made above to the probable original sources of the materials, although the fragments used by the Indians may have been brought in part at least by the streams, since similar fragments are found among the constituents of the terraces which are prominent in many places along both the Delaware and the Hudson.

Relative Abundance

Confidence in the above correlations with the probable sources of the materials is strengthened by consideration of the relative abundance of the various types. Thus at Trenton seventeen out of a total of thirty specimens are argillite, quite certainly derived from the Triassic formation, which is near at hand and which also affords numerous accessible outcrops of sound rock. The Triassic hornfels is also near, but only four specimens of this rock were found. The outcrops of hornfels, however, are much more restricted than those of argillite, and fresh specimens are by no means so readily obtained. An equal number of bluestone implements and fragments were also found, in spite of the distance of the available sources; but these rocks occur over wide areas and hard, fresh material in abundance is found in the natural outcrops. The other four specimens of the sandstone group represent nearer sources, but again this Cambrian rock is found only along narrow belts, and firm outcrops occur at comparatively few places. The single bit of siliceous oolite probably represents the more remote

TABLE

CLASSIFICATION OF MATERIALS

The materials referred to may be more fully classified and tabulated

Rock	Probable Age and Source	No. of Specimens		Distance from Trenton
		Trenton	Staten I.	
ARGILLITE				
Opal argillite	Triassic of N. J. and Pa.	14	8	5 to 30 miles
Calcite argillite		2	..	
Quartz argillite		1	1	
		17	9	
HORNFELS				
Scapolite hornfels	Triassic of N. J. and Pa.	1	1	8 to 20 miles
Quartz-calcite hornfels		2	..	
Hornfels breccia		1	..	
		4	1	
SANDSTONE				
"Bluestone"	Devonian of N. Y. or Pa.; or Ordovician of N. Y., N. J., or Pa.	4	..	70 to 125 miles
Ferruginous sandstone	Cambrian of N. J. or Pa.	1	..	40 to 50 miles
Quartzite		2	..	
Jasper		1	..	
		4		
SILICEOUS OOLITE	Cambrian or Ordovician of Pa. (or possibly N. J.)	1	..	40 to 175 miles
	Totals ..	30	10	

and more abundant sources in central Pennsylvania, although it may have come from one of the smaller inconspicuous outcrops of similar rock near the Delaware.

The total number of specimens is not large enough to give any particular quantitative significance to the exact proportions of the different kinds; but the great preponderance of materials from nearby sources and the influence of relative abundance and scarcity are clearly seen. As already intimated, the materials from Trenton may have been obtained by the Indians either directly from the natural outcrops or from river pebbles along the Delaware or from pebbles and fragments in the stratified drift of the Cape May formation, near the surface of which they were found. In any case, however, the approximate ultimate sources and distances for most of them may be conjectured with considerable confidence, and the relative abundance of the different materials is about what would be expected, whether they were brought by the aborigines or the river or both. Similar sources of supply may be predicated for Staten island and other localities along the Hudson.

It is curious to note that no specimens of Triassic trap rocks are found among these Indian remains, although these rocks are abundant in the vicinity of Trenton and also on Staten island. The basalt flows of the Watchung mountains and the denser contact facies of the diabase intrusives of the Palisades, Sourland mountain, and numerous other masses, would seem to meet all the requirements of hardness, toughness, and density of texture. These rocks are harder and heavier, however, and much tougher and hence much more difficult to work into shape by chipping, than argillite, hornfels, bluestone, and quartzite.[1]

AGE OF THE ARTIFACTS

From the petrographic examination of the materials alone no very definite conclusions can be drawn as to their age, but some of them are manifestly very old. Several of the blackish argillites are so bleached and altered that they are now a pale yellowish gray, and the bleaching has penetrated so far that only the central portion, or even a small central spot, retains the original color. These conditions are notably shown in Nos. 7303, 7448, 7476, 7485, and 7517, from Trenton, and in No. 4227 from Staten Island. One specimen from Trenton (No. 7485), undoubtedly a bleached argillite, is pale grayish in color throughout. Also the reddish quartzite from Trenton (No. 7333), originally a dark grayish rock, now has only a small central spot of this color.

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[1] A fuller discussion and more detailed description of these materials will be found in Bulletin 18, Geological Series, Department of Conservation and Development of the State of New Jersey.

The great age of these specimens is beyond question. They have been bleached by long exposure to the weather and the shallow ground waters since they were worked into their present shape. This process, especially in the dense argillites, is a very slow one, as may be seen in the natural outcrops of these rocks, which are decolorized to only a shallow depth as a rule.

On the other hand, some of the specimens are in a comparatively fresh condition, even on the surface. Apparently these are either less ancient or they have been imbedded in soil of a denser texture and hence have not been so fully exposed to the weather and the percolating ground waters.

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